General A&P
Skeletal Labs #1- Overview of the Skeleton

Pre-lab Exercises

Have someone in your group read the following out loud, while the others read along:

Skeletal Labs are commonly done over 2 weeks, and cover 3 labs in the lab book:

- **Overview of the Skeleton**
- **The Axial Skelton**
- **The Appendicular Skeleton**

The 'Walk About Guides' will use this sequence (no matter which order they appear in your book):

- **Week 1:**
  - **Overview of the Skeleton**
  - **The Appendicular Skeleton**

- **Week 2:**
  - **The Axial Skelton**

We will also be using images in the Lecture Textbook. Please remember that there are textbooks available within the lab room.

**Before trying to do these steps, we should have read the pertinent sections in the lab and/or lecture book, and watched any online videos my instructor has available.**

**The Steps** found in this first "Walk About Guide" do NOT have to be done in the order they are found."

Before you start, be able to:

1. Identify the separate chapters in your lab book.
2. Identify the separate chapters in your lecture book.
3. Make sure your lab table has an articulated and disarticulated skeleton.
**Step 1. Understanding the Basics Terminology and Regions of the Skeleton**

Use both your lab and lecture book to answer these questions. You may have to dig around a little bit to get the answers! Do not expect all the answers to be in one place!

Q1. Using your lab book and lecture book, write down 5 functions of the skeleton:

Q 2. What is an articulation? Do not just say "joint".

Q 3. Define the Axial Skeleton. Include its function, as well as the 3 main parts or regions:

Q 4. Define the Appendicular Skeleton. Include its function, as well as the 2 girdles and limbs:

Q 5. Define a girdle:

Q 6. Define the words "Disarticulated" and "Articulated":

Q 7. Which one of these images is the Appendicular skeleton, and which is the axial skeleton? Label "axial" & "appendicular" below the image. Label the parts that you identified in questions 3, 4 & 5 above.
Step 2. Understanding the shoulder joint, while learning some basic feature terms.

#1 You will be referencing the image "The Human Skeleton" and the table "Bone Markings" to answer some of these questions.

#2 Look at the articulated skeleton at your station. Find the shoulder joint.

#3 *(If you are not in a lab, you may skip #3)*

*If you are in a lab and have access to bones: Out of the "disarticulated skeleton box", pull out all the bones that are involved with ONE shoulder joint.*

Q8. How many bones are involved in the shoulder joint? Label the bone names on this image:
Q9: Using the table "Bone Markings", look at the real bones and decide which of the labeled structures are those listed on the table below. We started you out by placing "A" on the table.

<table>
<thead>
<tr>
<th>Process: A</th>
<th>Condyle:</th>
<th>Epicondyle:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossa:</td>
<td>Head:</td>
<td>Spine:</td>
</tr>
<tr>
<td>Tubercle:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q10: How many of the above terms area really a type of process? Which one is not?

Q11: Is an epicondyle a type of condyle? What do you suppose its name means?
Step 3. Understanding the hip joint, while learning some basic feature terms.

#1 You will be referencing the image "The Human Skeleton" and the table "Bone Markings" to answer some of these questions.

#2 Look at the articulated skeleton at your station. Find the hip joint.

(If you are not in a lab, you may skip #3)

#3 Out of the "disarticulated skeleton box", pull out all the bones that are involved with ONE hip joint.

Q12. How many bones are there? Using the image in your lab book, name them in the space:

Q13: Now....label the bone names on this image. Label all 3 bones of the os coxae:

Q15: How is the head seen on the femur SIMILAR to the head seen on the humerus? How are they different?
Q16: Using the table "Bone Markings", look at the real bones and decide which of the labeled structures are those listed on the table below. We started you out by placing "E" on the table.

<table>
<thead>
<tr>
<th>Process:</th>
<th>Condyle: E</th>
<th>Crest:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossa:</td>
<td>Head: E</td>
<td>Neck:</td>
</tr>
<tr>
<td>Foramen:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 4. Understanding the elbow joint, while learning some basic feature terms.

#1 You will be referencing the image "The Human Skeleton" and the table "Bone Features" in the "Introduction" lab, and images in the "Joints" lab to answer some of these questions.

#2 Find the image of the elbow joint in your lab or lecture book.

(If you are not in a lab, you may skip #3)

#3 Out of the "disarticulated skeleton box", pull out all the bones that are involved with ONE elbow joint.

Q17. Name the bones, labeling them on this image.

Q18. Complete this sentence:

(HINT: use the proper "Direction Terms" used in "Lab 1 - Intro to A&P & Terminology")

The shoulder involves the ________ end of the humerus, while the elbow involves the ________ end of the humerus.
Q19. Using the table "Bone Markings" in your book, look at the real bones and categorize the labeled structures on the image below, filling out the table below it. We started you out by placing "C" on the table.

<table>
<thead>
<tr>
<th>Process: C</th>
<th>Condyle:</th>
<th>Head:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossa:</td>
<td>Epicondyle: C</td>
<td>Neck:</td>
</tr>
<tr>
<td>Tuberosity:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q20. How is the fossa seen on the ulna SIMILAR to the fossa seen on the ulna?
Step 5. Vertebrae

You will be referencing the image "The Human Skeleton" and the table "Bone Features" in the "Introduction" lab,

#1 Find a vertebrae image in your book.

(If you are not in a lab, you may skip #2)

#2 Out of the "disarticulated skeleton box", pull out the vertebral column.

Q21. How many bones are there?

#3 Look at the individual vertebrae image in your book. Find one that looks similar to the one in the photo below.

Q22: FILL IN THE SECOND 2 BLANKS (I gave you the first answer!):

On the image above, "B" is pointing to the same thing as G, "C" is pointing to the same thing as ________, and "D" is pointing to the same thing as ________.

Q23: Using the table "Bone Markings" in your book, look at the real bones and categorize the labeled structures on the image below, filling out the table below it. We started you out by placing "B" on the table.

<table>
<thead>
<tr>
<th>Process: B</th>
<th>Foramen</th>
<th>Spine: B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facet:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q24: How is the spine seen on the vertebrae SIMILAR to the spine seen on the scapula?
Step 6. Bone on a gross level

To answer these questions, read and use these sections in your lecture book: "Bones & Osseous Tissue", "The Shapes of Bones", "General Features of Bone", and "Compact Bone", along with the accompanying image "Histology of Osseous Tissue".

Q25. What is another word for "bone tissue"?

Q26. Name the 2 types of bone tissue:

Q27. One the image below, classify these bones based on their shape. TRY TO DO THIS WITHOUT LOOKING THEM UP ... just by looking at the photo. You may use the bones on the skeleton if you'd like.

Classify these bones based on shape:
Below is an image of a dissected femur. There is also one in the lab room; retrieve the long bone dissection if it is available and examine it as you answer to the following questions:

Q27. Label the types of bone tissue indicated. Find them on the long bone dissection.

Q28. Correctly label the regions of a long bone indicated on this image, using these terms: Proximal epiphysis, distal epiphysis, metaphysis, medullary cavity

Q29. In the above image, where would you find:

   - The Growth Plate?
   - The Bone Marrow?
   - The Endosteum?
   - The Periosteum?
Q30. Label this drawing, using the wordlist below. You can use the terms more than once:

Articular cartilage  Epiphyseal line  Spongy bone (X2)
Compact bone (3 X)  Medullary cavity  Trabeculae
Endosteum  Periosteum (X2)  Yellow marrow
Step 2. For this step, you will be referencing the section in your lab book entitled "Microscopic Structure of Compact Bone". Read through the section, and answer the following:

Q31. What do we call a bone secreting cell?

Q32. Explain IN YOUR OWN WORDS the relationship between lacunae and osteocyte.

Q33. What do we call the structure that connects one osteocyte to another?

Q34. The "Bone Tissue Model" photo seen below is similar to the image in your lab book. Label the following:

Photo of Bone Tissue Model  Labeling Terms

Osteon - (2 of them)  Osteocyte in Lacunae- (2 of them)
Lamella (e) - (2 of them)  Bone Matrix- (2 of them)
Central canal- (2 of them)

Q35. ALSO: On the diagram, label the endosteum and periosteeum
Q36. There is a microscope in the room with a slide of Compact Bone Tissue. On the slide, find the following structures, while labeling both photos below.

*Photo of Compact Bone Slide*

**Labeling Terms**

- Osteon
- Lamella
- Osteocytes in lacunae
- Central canal
- Canaliculi
Step 7. An Introduction To The Skeleton In The "Black Box"

Have someone in your group read this out loud, while the others follow along:

In the room, there is a black box with a skull and several bones inside. Certain features on the bones have been painted different colors so you can easily distinguish them.

Find this box and bring it over to your work area.

Open it up and pull out some of the bones. Locate the femur, which looks like the bone dissection seen in Step 6.

Turn to the page in either your lab book or lecture book where the parts of the femur are labeled. (use the index in back if necessary).

Find on the femur diagram the Greater Trochanter. Notice that the line indicating it (called a "callout" on the image) is a little vague as to where the Greater Trochanter "starts" and "stops". Can you distinguish the boundaries?

Now....look where we painted this feature on the femur in the box. Notice how you can clearly determine the boundaries of the Grater Trochanter.

You may reference the bones in this box during the skeletal labs if you are having problems understanding where certain features "start" and "stop". However, it will not be in the "OPEN LAB".
Step 8. Do Only If Available, and if your instructor asks you to: Examining the effect of acid on bones.

This exercise may not be available; you should ask your instructor if your group needs to do this.

Read the section entitled "Chemical Composition of Bone" in your lab book. Read the activity "Examining the effects of Hydrochloric Acid On Bones".

Then, have someone in your group read the following out loud, while the others follow along. Finish by answering the 2 questions at the end.

Although we think of inorganic calcium salts when we think of bone ("hydroxyapatites"), bone is mostly collagen (the ORGANIC PORTION).

If there is a bone in lab that has been soaked in vinegar, examine it. Pick it up and GENTLY try to bend it. Note how the bone "looks", versus how it reacts to pressure, as per the questions in your lab book.

Collagen is a protein, so a person's genetic material determines how it is made. A mutation can cause a problem with collagen formation in the body, and therefore bone structure and function.

Also, a person needs several hormones, vitamins and dietary protein to make collagen properly. Vitamin D, for example, is necessary for proper collagen production. Not surprisingly, people with a vitamin D deficiency have problems with their bone development.

Continued on the next page
So anything that affects the formation of collage has a big impact on how bone tissue behaves. Below are 2 images: an X-ray of the forearms of a person with **Osteogenesis Imperfecta**, a genetic disease that causes defective collagen formation. Next to it is the photograph of someone with **Rickets**, a disease caused by a lack of Vitamin D in the diet.

Q37. Although these 2 pathologies affect all the bones, why do you suppose they are so obvious in the long bones? Why do the effects of these 2 TOTALLY UNRELATED PATHOLOGIES look so similar? Relate your answer to the anatomy of a long bone.

Q38. What do you think the name "**Osteogenesis Imperfecta**" means in Latin?? Figure it out from the Latin name!